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Mastitis and the Practitioner*

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I.—DIFFERENTIAL DIAGNOSIS

INTRODUCTION

The object of this paper is to summarise those facts about mastitis which are of importance to the general practitioner. Little fresh data will be presented. It is realised that so much is being written about mastitis in the veterinary Press of many countries, that the average practitioner with his very limited spare time is hard put to it to keep abreast of the latest developments in the many aspects of this disease. Actual references will be reduced to a minimum because, whilst these are essential in purely scientific articles, they interrupt the general "flow" of reading. The author has been in the unique position during the past five years of being able to examine the udders of several thousands of cattle, both healthy, and suffering from all types of mastitis, and to carry out complete bacteriological examinations of milk samples from these animals. In many instances treatment has been carried out and results followed through. In addition to this, a large number of milk samples submitted by practitioners, often accompanied by excellent summaries of the clinical picture, have been examined. The data which have thus become available, together with a summary of the literature, form the basis of this paper.

There seems little doubt that mastitis is the "Cinderella" of the more important cattle diseases. Judging by the replies to the N.V.M.A. questionnaire on the Survey Scheme mastitis is still the practitioner's stumbling block. It is odd to reflect that whereas many cattle are sold as tuberculin tested and blood tested, I have yet to see reference to "So and So's" herd of pedigree tuberculin tested, abortion- and mastitis-free cows.

BACTERIOLOGICAL CLASSIFICATION OF MASTITIS

It is necessary to classify mastitis in order to be able to make a differential diagnosis. Such classification can be made either on bacteriological grounds, or under the headings: acute, subacute and chronic. Whilst it is from the latter aspect that practitioners will encounter the disease on the field, a knowledge of the bacteriology is essential if the full value is to be obtained from laboratory reports, and if the correct specific treatment is to be administered. The various organisms which are associated with mastitis are shown in Table I.

TABLE I

CLASSIFICATION OF BOVINE MASTITIS

Organism	Type of Mastitis	Frequency of Occurrence
Haemolytic streptococci		
Group A	Acute	Very rare
„ B (*Agalactiae*)	Acute and chronic*	Very common
„ C	Acute. Sometimes chronic	Rare
Other Streptococci		
Str. Dysgalactiae	Acute	Clinically uncommon, occurs in "batches"
Str. uberis	Chronic	Clinically uncommon
"Non-specific" streptococci	Acute and chronic	Not studied in detail
C. pyogenes	Very acute*	Common some years
B. coli	Acute (chronic has been described)	Rare
M. tuberculosis	Acute and chronic*	Uncommon
Staphylococcus	Acute and chronic*	Common in some parts of England

* Indicates types of mastitis important from the clinical aspect.

* Based on an address given to the Mid-West Division, N.V.M.A., at Bristol, July 21st, 1944.

Streptococci in general are classified according to their action on blood agar. A *Beta haemolytic streptococcus* is one which grows with a clear zone around the colonies. Such streptococci can be divided into various groups by laboratory methods, each group being designated by a capital letter. Usually these groups are mainly associated with one host, *e.g.*, Group "A" is mainly a human pathogen, Group "B" (*Streptococcus agalactiae*, the organism of chronic contagious mastitis) with cattle, Group "G" with dogs, etc. Sometimes other animals are affected: Group "A" can infect the udders of cows and although Group "C" is the organism responsible for most suppurative conditions in horses (strangles, pneumonia, sepsis, etc., but not fistulous withers), a sub-type of this organism causes a rare type of mastitis in cattle. Group "C" mastitis as well as Group "A" is sufficiently rare to be ignored. It is put in here in case practitioners encounter it on laboratory reports. *Strept. agalactiae* has also been called Minett's Group I, *Strept. mastitidis*, etc. Similarly, *Strept. dysgalactiae*, an organism causing an acute non-contagious form of mastitis, usually of short duration, has been called Minett's Group II; *Strept. uberis*, which I believe to be of academic importance only, and which causes a chronic non-contagious form of mastitis, is sometimes referred to as Minett's Group III.

It is becoming increasingly obvious that staphylococcal mastitis can occur in a chronic form (very similar to chronic contagious mastitis) as well as in the acute gangrenous type.

The listing of tubercle mastitis as rare may come as a surprise, because this organism is so much in the limelight just now, but actually tuberculous mastitis is relatively uncommon.

I have included *B. coli* because recent articles suggest that one may hear more of this organism in the future.

There are also a number of conditions the bacteriology of which has not yet been well worked out. They include such conditions as "black spot" or "black teat end," and a troublesome condition in which blood occurs in considerable quantities in the milk. The chief significance of non-specific streptococci in the udder is that this may be the first sign of an oncoming infection: or this may indicate definite "weakness" in the quarter concerned meaning that it is ready for infection by the first pathogen to arrive.

Some idea of the relative frequency with which these various organisms occur can be obtained from Table II, the figures given being published for the first time.

TABLE II

FREQUENCY OF OCCURRENCE OF MASTITIS ORGANISMS

Organism	Number of Milk Samples containing Organisms			
	Column I*	Column II*	Column III*	Column IV*
Streptococcus agalactiae	331	110	837	678
„ *dysgalactiae*	9	6	4	5
„ *uberis*	13	6	4	2
Group "C" streptococcus	1	3	0	2
Non-specific streptococci	8	14	0	4
Staphylococci (apparently pathogenic)	37	22‖	10	22
Corynebacterium pyogenes	71†	20	10	7
B. coli	4	1	0	0
Coli-aerogenes group	3	2	0	0
Mycobacterium tuberculosis	4	4	0	2
Blood in milk	5	3	—	—
Normal milk apparently sterile	120	35	1,240	1,330
Abnormal „ „ „	88	22	2	0
Contaminated samples	36	18	—	—
Total	620	266	2,107‡	2,062§

Notes.—* Column I.—Random samples examined *before* 1.11.43.
* „ II.— „ „ *after* 1.11.43.
* „ III.—Milk samples from herds under mastitis control.
* „ IV.— „ „ examined once.
†Two samples also had *agalactiae* present.
‖Including three cases with *Str. agalactiae* present.
‡Including 744 cows from tuberculin tested herds.
§ „ 401 „ „ „

Column I shows the analyses of random milk samples submitted by practitioners and examined prior to 1.11.43. Most of these were from clinical cases.

The large number of clinically abnormal but apparently sterile milk samples is undoubtedly high. There are several possible explanations :—

(*a*) Our technique may be faulty.

(*b*) Factors other than bacteria may be responsible (see later reference to virus theory).

(*c*) Cows with an active mastitis may excrete sufficient antibodies to inhibit the multiplication and growth of the causal organism *in vitro*.

(*d*) Samples may have been submitted after unsuccessful sulphanilamide therapy. The presence of this drug in the milk frequently prevents the organism from developing *in vitro*.

To reduce these factors the microscopic examination of incubated milk samples was added to the routine diagnosis tests carried out after 1.11.43, and results are shown in Column II of Table II.

It will be realised that these figures do not represent a true cross section of relative frequency, because practitioners are not likely to submit typical samples of *Strept. agalactiae* or *C. pyogenes* mastitis, and most practitioners do their own tubercle examinations. A truer picture can be obtained by analysing the results obtained from herds on which repeated examinations of milk samples have been made. These figures which are given in Column III refer to cows (*i.e.*, one cow may have had several tests). Even this does not give quite a correct representation because since most of these herds were the property of farmers who had requested mastitis control the original agalactiae figure would be abnormally high. The most representative set of figures are those given in Column IV which concern herds tested once only.

The incidence of summer mastitis varies from year to year. 1944 will be remembered as a particularly bad year for this disease, but the number of cases occurring in these random samples was fairly low.

It will be seen that no reference is made to actinomycosis. In spite of the Milk and Dairies Orders, I do not believe that primary actinomycosis of the udder has ever been reported and by the time secondary lesions had appeared in the udder from other foci, the animal would in all probability be moribund.

DIFFERENTIAL DIAGNOSIS

Streptococcus agalactiae is the organism associated with, and may be the cause of, chronic contagious mastitis. This is a bad name because the disease can occur in both the acute and the chronic states.

(*a*) Chronic Mastitis.—This condition is well known. Cows suffering from this disease show symptoms sometimes extending over a period of years. The severity of these symptoms varies very greatly : sometimes the milk is quite normal, whilst at other times the first draw or two consists chiefly of white flakes or "curds." Occasionally the first half pint or so is quite unusable. The severity of symptoms is increased by such adverse factors as cold draughts, sharp temperature drops, sudden changes of diet or milking routine, etc. Any number of quarters may be infected and clots appear sometimes in one, then in another quarter without any apparent guiding factor. Contrary to the generally accepted outlook, the author does not believe that the economic loss due to this chronic form is very great. Fibrosis of the quarter does occur and may be discernible after milking, especially when comparison is made with a normal quarter. The rate of fibrosis is, however, very slow and physiological hypertrophy of the unaffected quarters usually outweighs the pathological atrophy of the diseased tissue. Animals chronically affected can, and do, give high milk yields. There are no systemic disturbances in the cow. The condition is a nuisance towards the end of lactation as it is sometimes difficult to dry up a chronically affected quarter. Suggestions as to how to deal with the problem are made in the section on treatment. Occasionally the supra-mammary glands become enlarged in chronic mastitis, although tubercle bacilli are absent.

(*b*) Acute Form.—This is undoubtedly the most important of all the types of mastitis. It is responsible for the majority of blind or shrunken quarters, for misshapen udders, and considerable financial loss due to the selling off of uneconomic beasts.

It is difficult to give a "text-book" description of the condition, because the picture presented in one herd may vary considerably from the picture presented in another. The following are, however, the salient points of the disease :—

The mastitis may develop very quickly ; a cow is sometimes quite normal at the evening milking and has acute mastitis the next morning ; acute cases may develop from chronic or from sub-acute cases, or may be the result of breakdown from previous treatment. Any number of quarters may be affected. Acute *Streptococcus agalactiae* mastitis occurs almost exclusively in milking cows, of all ages, from first calved heifers onwards. Mastitis may develop at any stage during lactation but acute attacks are rare during the latter end of pregnancy.

The quarter usually feels very hard, but one can feel through the skin to the hard tissue underneath (*c.f.* pyogenes) ; the mastitis can be quite severe and yet the quarter remain comparatively soft. Pain is not a feature of this disease, the quarter is not usually "hot" to the touch and systemic disturbances are almost nil. It is sometimes astounding to find a quarter very badly affected, yielding nothing but a pus-like secretion, and yet to find no general reaction on the part of the cow. On rare occasions, however, deaths from *Strept. agalactiae* have been recorded. The appearance of the milk varies but one feature is constant—the presence of white or creamy clots of varying size ; these clots occur in a cloudy fluid which, the more acute the condition the more it simulates serum. I find the following two descriptions most common in my case book, "dark stone coloured, cloudy fluid with clots," and "clear yellow serous fluid with a few large clots." In very acute cases shreds of epithelium and actual blood vessels may be present in the debris, although the secretion in these cases consists usually of a little clear (yellow orange) serum-like fluid. If the quarter is not treated the milking tissue is usually destroyed within a month and a blind quarter results.

It is admittedly difficult to differentiate at times between acute streptococcal mastitis, atypical cases of tuberculous mastitis, early staphylococcal mastitis and early atypical cases of summer mastitis.

The following are the chief diagnostic points of acute streptococcal mastitis—skin mobile over hard quarter, lactating animal, little pain, flakes in milk, little systemic disturbance, response to sulphanilamide, absence of acid-fast organisms.

Groups "A" and "C" Mastitis.—Both these cause an acute painful mastitis with a pus-like secretion that does not smell. Temperature of the cow is raised several degrees. Diagnosis is, however, based on laboratory reports. The importance of Group "A" is that if the public drink milk containing this organism, widespread outbreaks of such troubles as septic sore thrpat, etc., will develop.

Streptococcus dysgalactiae is more often diagnosed bacteriologically than clinically, but can cause an acute mastitis, usually of short duration. This trouble is associated with bad milking technique (rough milking, excessive vacuum on the milking machine, etc.) and usually several cows are affected simultaneously. The disease will respond well to sulphanilamide but usually cases have cleared up before the drug is administered, and other cows may by that time have developed the trouble. There is a moderate hardness of the quarter, the milk is thin, brown and contains a granular deposit.

Streptococcus uberis.—Again diagnosis is usually by laboratory methods, such cases being discovered during routine herd examinations. The mastitis caused is similar to *Strept. agalactiae* mastitis, although the milk usually has a darker hue. Lack of response to treatment is a helpful feature.

Staphylococci.—Chronic form. The existence of this disease in a chronic form has not been recognised for a sufficiently long period to enable a clear-cut clinical picture to be developed. The disease appears to run a course similar to *Strept. agalactiae*, but does not, of course, respond to the sulphanilamides, and other streptocidal agents. Chronic staphylococcal mastitis is known to be more common in certain areas, *e.g.*, Holderness area of Yorkshire, Central and S. Wales, and S.W. England. Practitioners in these areas are advised to submit to the laboratory samples from cows belonging to herds in which chemotherapy has not been successful. Unfortunately staphylococci are so ubiquitous that it is not possible to be dogmatic when staphylococci are demonstrated in a milk sample. It has been the author's practice to report such cases as "probably staphylococcal infections" and to request a further sample. If this milk still contains staphylococci a definite diagnosis is made.

Acute form. The end product of this disease is well known—a cold, gangrenous quarter yielding a dark brown fluid ; the cow toxic with subnormal temperature. If treatment is to be successful an early diagnosis is essential. The following points may help—the first symptom is that there appear to be gas bubbles under the skin at the top of the teat. Milking the quarter gives a sensation similar to that of stripping out a quarter that has been blown up with air. The milk tends to have a bright orange colour. This is not always a reliable feature because acute *Strept. agalactiae* milk is often of an orange hue ; the staphylococcal milk is, however, a little more intense in colour. The cow frequently has a normal or subnormal temperature. The quarter becomes hard and painful one to two days after the onset of symptoms and, if treatment is not instituted, gradually turns blue, cold and necrotic with corresponding toxaemia of the animal. When cases recover a portion of the udder usually has a stone hard feel which is quite distinctive. Diagnostic features (cow in milk) are : hard, painful, or necrotic udder ; systemic disturbance ; secretion orange coloured turning to dark brown, no smell.

C. pyogenes causes summer mastitis. All pyogenes infections are summed up in one word—"smell." Pyogenes causes a typical penetrating smell in any secretion from the affected site. This smell is the same for pyometritis, summer mastitis, pyogenes abscesses, etc.

Summer mastitis occurs chiefly in dry cattle of all ages. Maiden heifers from twelve months onward can be affected in a bad year. The characteristic symptoms are : a sudden onset with a brick-hard quarter. The skin is so tense that one cannot feel through it. Usually only one or two quarters are affected. The quarter is hot and painful and the cow usually stiff in her gait. The hocks may swell before udder symptoms develop, but this feature is not constant. The secretion is thick, of uniform consistency, greenish yellow in colour, with the usual pyogenic smell and may contain blood clots. Only a little can be stripped out at any one time. The temperature of the cow is elevated, usually reaching 103° to 104°, but may go higher. Toxic symptoms vary—the animal may be a little depressed or may be acutely ill. Deaths frequently occur in a bad year. Occasionally the typical secretion is not encountered until several days have elapsed. In these cases the " milk " is represented by a serous fluid containing a few large clots with blood vessels, sometimes accompanied by the pyogenic smell. Such cases can be differentiated from acute streptococcus by the hardness of the quarter and the elevated temperature.

Tuberculous Mastitis.—The author has had little experience of the clinical diagnosis of this disease. The following notes are accumulated from the experience of several practitioners : the " standard " description of this type of mastitis is that of a cow in poor condition with an enlarged quarter which gradually becomes atrophied, the secretion being normal at first, but gradually changing to a whey-like fluid with clots : the supra-mammary glands are enlarged and the temperature, though variable, is usually high. Unfortunately the number of cases conforming with this description is small. Tuberculous quarters may be found in cows in good condition, and with normal temperatures. The glands are not invariably enlarged, or paradoxically may be so enlarged that their actual palpation is difficult. Sometimes tuberculosis of the skin over the gland may be encountered and this hardness prevents critical examination of the gland. Fibrosis of varying degree is present and it may be difficult, especially in acute cases, to differentiate between tuberculous and streptococcal mastitis ; a difficulty accentuated by the fact that the secretion from both cases consists of yellow serous fluid with clots. The majority of milk samples sent to this laboratory for examination for acid-fast bacilli prove to contain pure cultures of *Strept. agalactiae*, whilst a few samples suspected of containing agalactiae actually contain tubercle bacilli.

The only true criterion is to demonstrate thin beaded acid-fast bacilli in the sample.

B. coli occasionally causes mastitis of an acute type, but the aetiology is not well established. Cases appear to yield a port wine-coloured fluid not unlike that from a staphylococcal quarter. Record work in America suggests that this organism occurs more frequently than has been suspected hitherto.

Slime Organisms.—From time to time cases are met in which the milk from one or more cows appears normal when first taken, but after standing for half an hour or longer, develops a slimy condition. Examination of milk samples does not yield anything significant and the diet does not appear abnormal. Closer enquiry usually extracts the fact that the drinking water is of poor quality. It seems that the trouble is caused by organisms of the coli-aerogenes group becoming established in the udder. Attention to the drinking water sources and dosing with formalin usually clears up the condition.

" *Bloody* " *Milk.*—A well-defined condition exists in which one or more quarters suddenly become hard, hot and swollen. The milk secretion is normal except that a considerable quantity of blood is excreted ; this gives the milk a brown colour at first but the latter half of the milk appears bright red. If allowed to stand the blood settles and normal milk remains. Such conditions are invariably sterile and the primary cause appears to be physiological or pathological. Treatment is non-effective, but the quarter usually settles down in four to five weeks.

The various differential diagnostic points are summed up in Tables III and IV.

Table III
Differential Diagnosis of Chronic Mastitis

Organism	Clinical Data	Appearance of Milk	Incubated Milk Smear	Other Data
Strept. agalactiae	Slight induration of one or more quarters. Several cases in herd at same time. Diminished milk yield ? Tendency for several cases to show simultaneous fluctuations	Daily variation ; few flakes. At times dark stone fluid with pus for two or three draws	Cells and long chains of streptococci	History of acute streptococcal mastitis in herd. Similar cases established by laboratory tests to be agalactiae
Strept. uberis ..	Very gradual fibrosis ; odd cases only	Thin brownish fluid	Long streptococci only	Little response to sulphanilamide
Staphylococci ..	Gradual fibrosis ; clinical picture not clear	Thin with clots. Tendency to have orange tinge	Cells and staphylococci in cytoplasm ; may be large numbers diplococci	Not many cases occur simultaneously. Not so much daily variation as noted with streptococci
Tubercle bacilli	Enlarged quarter ; localised fibrosis. Possibly enlarged glands	Thin ; sometimes with clots	Cells only	Acid-fast bacilli. Persistent high temperature. Poor condition of animals in herd
Coli-aerogenes	No discernible changes in udder	Slimy appearance of milk after standing	Varied flora	Trouble appears in different animals over a short period of time. Bad hygienic conditions

Table IV
Differential Diagnosis of Acute Mastitis

History	Feel of Udder	Appearance of Secretion	Clinical Data	Smear of Incubated Milk	Diagnosis	Treatment
Very sudden onset. May be history of similar trouble in same cow	Hard under skin. Little or no pain	Yellow with clots. Yellow serous fluid with orange tinge. Blood vessels in serous fluid ; dark stone-coloured fluid	Little systemic disturbance. Other cows in herd periodically affected	Cells with long chains of streptococci	*Strept. agalactiae*	Sulphanilamide *per os* " E.O.S. " L.S.F. emulsion Acriflavine emulsion Acridine dyes Tyrothricin M. & B. 137 Novoxil
Dry cow or heifer. Udder noticed to be swelling previous day or so. One animal in bunch seen to be dull	Brick hard. Hot ; painful	Thick, yellowish green. Penetrating smell. Sometimes clear serous fluid or brown pus, with smell	Maiden heifers onward. Systemic disturbance. High temperature. Swollen hocks	Mass of thin beaded bacilli. Few cells	*C. pyogenes* (summer mastitis)	Pyogenes anti-serum " toxoid M. & B. 693
Very rapid onset. No response to sulphanilamide	Gas under skin. Difficult to milk. Later, cold, doughy feel. Sequelae: sloughing, stone hard portion of udder	Bright orange. Turbid brown. Dark plum	Systemic disturbance. Temperature usually elevated but may be normal or sub-normal	Cells and staphylococci. No long streptococci but mixed infections do occur	Staphylococci	Staphylococcus toxoid Sulphathiazole
Fairly rapid onset, chiefly post-parturient	Quarter may be very hard. Areas of fibrosis. Enlarged quarter	Thin with clots. Clear serous fluid with clots	Poor condition of herd. Fluctuating temperature. Swollen glands	Cells only	Tuberculosis	None
Several sudden cases in herd. Not always in the same cows	Hard. Rapid changes	Thin brown	Several animals affec ed for short duration. Response to sulphonamides	Cells plus short chains of streptococci	*Strept. dysgalactiae*	Sulphonamides. Revise milking technique
Odd cases. No useful history	Tense, painful	Bright red (blood)	Normal cow with usual pain reactions	Red blood cells. No organisms	?	Symptomatic

Mastitis in Other Animals

Goats suffer from a condition which clinically simulates streptococcal mastitis in the cow. But nearly all these cases yield a pure culture of haemolytic staphylococci—such cases sometimes respond to the use of staphylococcal toxoid. These animals also develop a similar condition to that already noted in cows, in which considerable quantities of blood occur in the milk, no demonstrable organism being present.

Sheep.—The important mastitis of these animals is the gangrenous staphylococcal type. This condition runs a parallel course to that of cattle except that it is a little less acute in the onset. Treatment follows similar lines.

Horses.—Mastitis does not appear to constitute an important disease of horses. Hardening of one side of the udder is noted from time to time, but no common factor can be found over a number of cases. Sometimes Group "C" streptococci are isolated from the milk but as these occur so frequently in specimens of equine tissue it is difficult to assess their significance.

(To be continued)

REVIEW

[**Alternate Husbandry.** I.A.B. Joint Publication No. 6. Published by the Imperial Bureaux of Pastures and Forage Crops (Aberystwyth), Soil Science (Harpenden), Animal Breeding and Genetics (Edinburgh), and Animal Health (Weybridge), May, 1944. (Imperial Agricultural Bureaux, Central Sales Branch, Agricultural Research Building, Penglais, Aberystwyth, price 5s.)]

This publication provides an eminently readable, if in parts somewhat elementary, account of the factors involved in alternate husbandry. The nine sections are: Trends in different countries and regions (R. O. Whyte); The influence of herbage rotations on the soil (G. V. Jacks); The roots of herbage plants (R. O. Whyte); Types of leys and their component species (R. O. Whyte); The animal crop in relation to alternate husbandry (J. E. Nichols); Fertility types, production and requirements (R. O. Whyte); Alternate husbandry and current agricultural problems (R. O. Whyte); Alternate husbandry and animal diseases (E. L. Taylor); and Economic factors in changes from other agricultural and pastoral systems to alternate husbandry (A. W. Ashby and W. J. Thomas). Most sections have excellent bibliographies.

Space does not permit of a detailed review of the work as a whole, but it may be said that veterinarians from certain parts of Great Britain, and from many parts of the Empire, will find in it much of direct practical value to their work. It is obvious that the animal husbandry aspects, particularly in ley farming, are at present but little understood. In the chapter on the animal crop, Dr. Nichols—who unfortunately cites no references—is deliberately cautious in interpreting such data as are available. The sub-section in his contribution entitled "Animal physiological factors in husbandry" is limited to such considerations as size of the animal, although it contains a brief note on the system of continuous cross-breeding and on the contrasting system recently adopted in certain sub-tropical areas, whereby an attempt is made to construct a new type or breed of better adaptation or performance than existing types by combining physiological traits of performance, growth, hardiness, and disease resistance from two or more breed origins.

Dr. Taylor's contribution deals mainly with parasitological implications, and many of his points will be familiar to those who have read his contributions to *The Veterinary Record*. He omits consideration of the important nutritional and metabolic disorders of grazing animals—except for calorific deficiency—but deals briefly with the little that is known relating to the influence of alternate husbandry upon bacterial and virus diseases. A strange omission, in view of the fact that he discusses the viability of *Mycobacterium johnei* excreted in the faeces, is any reference to the work at Shinfield on the survivability of *Mycobacterium tuberculosis* in cow dung.

Veterinary students will find the publication of value for their courses in Animal Husbandry, Part II, and in Parasitology.

Weekly Wisdom

"... *Another great advantage which the veterinary art enjoys is that of not being infected with the poison of hypothesis—a poison which, being transmitted, if we may so say, from the mind of the physician in which it was nourished into the veins of the patient, has occasioned a thousand murders every day. ...*"—From an introductory lecture delivered by Claude Bourgelat, the founder of the veterinary schools in Europe, about 1770. (*The Veterinarian*, 1831, 4, 640.)

CLINICAL COMMUNICATIONS

Caesarean Operation in a Heifer

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Subject.—A cross-bred Ayrshire heifer, about 2½ years old.

History.—A few weeks after being served, the heifer had fallen over a high bank into a glen—about 60 or 70 feet—and with great difficulty had been brought out on a horse-drawn cart after repeated attempts had been made to pull her up the bank with ropes drawn by a pair of horses. From the time of the fall, development of the pelvic region appeared to be arrested, although the heifer was on her feet a few days later and appeared little the worse for the accident. We were called to a "calving case" when labour had been in progress for about six hours.

Examination.—On arrival at the farm at 8 p.m., it was discovered that the heifer was on a hill about half-a-mile from the steading. Water, soap and a hurricane lantern were taken to the spot, the patient got to her feet and was taken to the byre before examination could be made. It was then found that presentation was anterior, with both fore feet in the pelvic cavity and the nose just entering therein. The pelvic cavity was very small and the calf was dead; otherwise no deformity—maternal or foetal—could be detected. The heifer lay down on her right side during this preliminary examination. The head and fore legs of the foetus were roped separately, the fore legs partly repelled, and traction applied to the head, but even with three men pulling on the rope the head could not be brought into the pelvic cavity. Embryotomy was considered, but it was evident that no advantage was to be gained.

Operation and Course.—The owner was then informed that the only means of delivering the calf was by Caesarean operation, the other alternative open to him being to salvage the heifer. After much questioning and deliberation, the owner consented to the operation, and it was then discovered that the only instruments likely to be of use in carrying out the operation were hypodermic syringe and local anaesthetic (5 per cent. Procaine—Hewlett's), scalpel, scissors, suture needles and silk, liniment of iodine and cotton wool. We* were without even a pair of artery forceps. Such instruments as we had were placed on a clean milk basin, the patient given 1 oz. chloral hydras in a pint of water per os, and, after turning her over on her left side, the site of operation on the right flank was infiltrated with about 40 c.c. local anaesthetic. The hair was slipped as short as possible for a distance of about three inches on either side of the line where the skin incision was to be made, and for about three inches beyond the ends of this area. The skin thus bared was well swabbed with liniment of iodine. The skin incision was then made, extending from about six inches below the transverse lumbar processes in a downward and slightly forward direction, and about 15 inches in length. The muscles were each incised in turn (bleeding being easily controlled by swabbing with wool) and then the peritoneum. All incisions were made in the same direction as that in the skin and no attempt was made to separate the muscles in the direction of their fibres. The uterus was brought up to the wound, but could not be taken through it. The uterine wall was incised transversely for a distance of about 12 inches and the foetus extracted by the hind legs. The foetal membranes were removed *via* the flank, and the uterine wound sutured by a double row of Lembert sutures. Peritoneum and muscles were sutured by mattress sutures and the skin by ordinary interrupted sutures. The supply of silk ran out when about half the skin wound still remained to be sutured and coarse grocer's twine was used to complete the operation.

The heifer showed no evidence of pain at any time after administration of the chloral hydras and was left about midnight lying on her left side just as she had remained throughout the operation.

When the owner saw her next morning at 6 o'clock she was on her feet eating hay. She continued feeding and cudding throughout convalescence not a meal being missed. Sulphanilamide per os was given for five or six days, commencing 12 hours after the operation with 3 oz. and followed by three 1 oz. doses per day. The temperature rose to 104° F. about the fourth day and the muscles and skin on either side of the wound gave way under the strain of the sutures for about six or seven inches of the middle part of the wound. A space of about 1½ inches wide at the widest part remained for about a week and was dressed with castor oil. Suppuration was slight and the gap gradually closed. At eight weeks all that could be seen of the wound was an elliptical area about six inches long and ½ inch wide devoid of hair, and this is rapidly disappearing.

Conclusions.—Even without adequate preparations Caesarean operation can be carried out as an emergency operation with prospects of recovery.

* Mr. D. Buntain, M.R.C.V.S., assisted at the operation.

Poultry Poisoned by Zinc Phosphide

TOM HARE AND A. B. ORR

Apparently under the auspices of county war agricultural committees and local authorities zinc phosphide, Zn_3P_2, is being used extensively for the destruction of rats. During the first two weeks of this month (November) we have determined the poisoning of poultry by zinc phosphide in three widely separated localities.

Case 15693. The bodies of two adult geese were received for autopsy. Of 37 geese 22 were found dead during the morning after feeding. A sample of the food, which consisted mainly of boiled rice, revealed approximately 1½ grains of zinc phosphide per ounce. The crops and gizzards of the two geese contained food similar to the sample. The contents of the two gizzards revealed approximately 1/18th and 1/7th of a grain of zinc phosphide per ounce respectively.

Case 15784. The body of an eight-months-old pullet was received for autopsy. Of 16 pullets ten were found dead or dying during the morning after the usual mash feed. The fowls had the run of a yard including a rubbish heap which was used by the occupants of the premises, among whom was the rodent officer of the local council. The pullet was in a good state of nutrition and had been in active lay; its crop and gizzard contained mash and pieces of grass. Approximately 1/12th of a grain of zinc phosphide per ounce of the crop contents was identified.

Case 15865. The bodies of two adult pullets were received for autopsy. The pest officer put down "poison" on a premises which adjoined a pen of poultry. The pest officer had warned the poultry owner to keep his fowls shut up until given notice that the "poison" had been removed. "Dozens of rats were found dead within 20 minutes of the laying of the poison." On receipt of the pest officer's notice that the "poison" had been removed the owner let out his pullets. Within two hours of their liberation six of the eleven pullets had died. In one pullet the crop contents, comprising mash, revealed approximately ¼th of a grain of zinc phosphide per ounce; the gizzard contents revealed approximately 1/12th of a grain per ounce. The crop of the second pullet had been opened and its contents had been removed; approximately 1/22nd of a grain of zinc phosphide per ounce of the gizzard contents was identified.

No clear description of the behaviour of the poisoned birds was received. The other findings common to the two geese and three pullets were acute necrosis of the liver, engorgement of the heart by dark blood and the odour of carbide (acetylene) in crop and gizzard contents. This odour, which was strong in the sample of boiled rice (case 15693) was not detected in the opened crop of the pullet referred to in case 15865.

The carbide odour is due to the liberation from zinc phosphide of the gas phosphine (phosphuretted hydrogen), PH_3, which appears to be the rapidly effective toxic principle. As proof of the presence of the poison depends on the chemical detection of phosphine, bodies for autopsy and toxicological analysis should be sent unopened and with the least delay. Any material suspected of being the source of the zinc phosphide should be packed in an air-tight container.

SCIENTIFIC PAPERS FOR LIBERATED EUROPE

Sir William Beveridge, Professor P. M. S. Blackett, Mr. E. Carter, Mr. J. G. Crowther, Dr. C. D. Darlington and Sir Richard Gregory have have signed an appeal for scientific literature for liberated Europe.

They point out that scientists in liberated Europe need literature dealing with advances made in allied countries during the war. In particular French scientists need this material. Literature would go to the Centre National de Recherche Scientifique in Paris, which is in touch with the whole body of French scientific workers. Single copies would be microfilmed and films and abstracts distributed.

Appealing to British scientists for copies of scientific journals, technical papers, reprints, etc., from January, 1940, onwards, the writers say: "We know it is hard for scientists to part with complete sets of journals they have collected over years, but in this country there are well stocked libraries which can be consulted, and this is not the case in France and the other newly liberated countries." Sets of journals and single copies should be sent to the Association of Scientific Workers, Hanover House, 73, High Holborn, W.C.1.

* * * * *

For failing to cleanse and disinfect two railway trucks used for the conveyance of animals during a foot-and-mouth disease epidemic in Morayshire in September, the London and North-Eastern Railway Company, Ltd., was fined £8 in Elgin Sheriff Court. There were two separate charges.

ANNOTATION

Induction of Lactation by Synthetic Oestrogens

The discovery that lactation could be artificially induced by administration of oestrogen alone was made by Folley, Scott Watson and Bottomley (1940, 1941*a*), who produced copious lactation in goats by inunction of the udder site with an ointment containing diethylstilboestrol; two heifers similarly treated failed to respond to the same extent (Folley *et al.*, 1941*b*). Walker and Stanley (1941), however, obtained milk yields of over 1 gallon per day from two heifers by a prolonged course of injections of diethylstilboestrol dipropionate.

These discoveries were of great physiological interest and it seemed not unlikely that their practical application might prove a valuable aid, especially in war-time, in dealing with the problem of the infertile heifer and cow of good milking strains which have failed to respond to sterility treatment. Normally these animals are fattened and slaughtered, but if they could be brought artificially into lactation they would then pay for their keep and add to the national milk supply while further attempts were made to get them in calf.

Experiments on the artificial induction of lactation were carried out at various centres in England and co-ordinated by the Agricultural Research Council. The results of these experiments have now been published as a series of papers in the *Journal of Endocrinology*; their titles are listed below.* Space does not permit giving comprehensive abstracts of the seven papers, but points of practical importance will be indicated.

In the experiments a total of 256 heifers and cows (of which some two-thirds were sterile) of various ages and breeds were used.

To produce mammary changes necessary for lactation, treatment with oestrogen must be continued over a period of several weeks, and as treatment by repeated inunction or injection is entirely unsuited to wide-scale practical application, various other methods were investigated.

(*a*) *Subcutaneous implantation of tablets of oestrogen.*

This method involves two minor surgical operations—the implantation of the tablets and their removal when the milk yield has approximately reached its peak. It was originally supposed that small (15 to 50 mg.) tablets must be used to ensure a sufficiently high absorption of oestrogen and batches of 50 to 200 of these were implanted, but these small tablets were frequently very difficult to remove owing to fragmentation and subcutaneous migration. Folley and Malpress have obtained promising results by using a few large (1,000 mg.) tablets, the removal of which presented no difficulties. There appears to be no advantage in using implants which give a daily absorption of more than 12 mg.

The method of intraperitoneal implantation was used by Hammond, jun., and Day in 30 animals to find whether rapid and complete absorption of the implant would take place, but the method proved technically difficult and less effective than the subcutaneous method.

Tablets containing 50 per cent. soluble excipient were implanted in 12 animals by Folley, Stewart and Young, but contrary to expectation these implants failed to be rapidly and completely absorbed, and surgical removal was still necessary.

* *The Journal of Endocrinology*, June, 1944. Vol. 4, No. 1.

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The oestrogens used for implantation were: stilboestrol (diethylstilboestrol), hexoestrol (*meso*hexoestrol), and stilboestrol dipropionate (five cases only).

(*b*) *Oral administration.*

To obviate completely the necessity for operative procedures, various methods of oral administration were investigated by Folley and Malpress. The oestrogens used were: stilboestrol, hexoestrol and dienoestrol.

(*c*) *Administration by single injection of esters of diethylstilboestrol.*

The rate of absorption of natural and synthetic oestrogens following subcutaneous injection can be decreased by using an ester of the oestrogen. Parkes and Glover investigated the possible application of this fact by giving single injections of an ester of stilboestrol or a single injection of a combination of a rapidly acting and a slowly acting ester. The esters used were the dipropionate, di-*n*-butyrate, dicaprylate, dicaprate, dilaurate and dipalmitate.

Results

Individual variations in response were very great with all types of administration. On the whole "tablet-implantation" gave the most satisfactory results. The yields obtained varied from no response to a maximum daily yield of 30¼ lb. and a maximum total yield of 9,808 lb. Approximately 50 per cent. of the animals produced an economic quantity of milk.

Preliminary trials with oral administration of oestrogen gave satisfactory responses, but further experiments gave less encouraging results probably in part due to an age factor—this group of heifers and the group receiving the injections of esters were considerably younger (under 2 years) than the other animals.

The milk yields obtained from the heifers treated with the esters appeared to be no better than the yields obtained from heifers of like age by oral administration of oestrogen.

The composition of the milk of bovines artificially brought into lactation has been most extensively studied by Folley and Malpress, who have shown that a daily yield of 5 lb., and often much less, can be regarded as a guarantee of normal composition. A preliminary report by Lawson, Stroud and Williams shows that only traces of oestrogen are present in the milk (generally less than 0·5 to 1 gamma—a quantity of no practical significance).

In addition to the uncertainty of response there are certain drawbacks to the treatment which must not be overlooked. During the period of oestrogen dosage most animals exhibit the nymphomaniac syndrome to a varying degree and if they are allowed to run at pasture with other animals the risk of serious injury—such as fracture of the pelvis—is very great. A number of these fractures were investigated. No evidence of decalcification was found and it is believed they were entirely due to trauma resulting from persistent coital mimicry, the relaxation of the pelvic ligaments acting as a probable predisposing factor. Cases of prolapse of the vagina and rectum also occurred. The alteration of the conformation due to relaxation of the pelvic ligaments persisted in some degree for a very considerable time after cessation of oestrogen treatment.

During oestrogen administration the ovaries become inactive, but regular oestrous cycles are generally re-established two months after oestrogen administration has ceased. There is no evidence that the treatment has any detrimental effect on the subsequent breeding capabilities of the animals.

It must be concluded that unless the variability of the milk yields and other drawbacks associated with the treatment are overcome by further research, the application to general farm practice is limited.

References

Folley, S. J., Scott Watson, H. M., and Bottomley, A. C. (1940.) *J. Physiol.* **98.** 15P.
Ibid. (1941*a*.) *J. Dairy Res.* **12.** 241.
Ibid. (1941*b*.) *J. Physiol.* **100.** 7P.
Walker, S. M., and Stanley, A. J. (1941.) *Proc. Soc. Exp. Biol., N.Y.* **48.** 50.

A. T. Cowie.

100 Years Ago.—On Monday, Mr. Charles Chapman, Lethenty, Fyvie, applied about four ounces of tobacco juice to remove vermin from a fine two-year-old quey; but, in less than an hour after, the animal was found in strong convulsions; and although every possible remedy was applied, it was of no avail—fit followed fit till it ended in her death, about six and a half hours after being rubbed. —*Glasgow Herald* (25/12/1944).

* * * * *

The highest price obtained at a public auction in Argentine for any British-imported bull has been paid for the Aberdeen-Angus, Better of Derculich, bought by Jose Firpos & Sons, Ltd., for 150 000 pesos (approximately £8,800). It is believed to be the second highest price paid in the world for an Aberdeen-Angus, says a Reuter message from Buenos Aires. The bull, which was fourth in his class at Perth last February, where he sold for 550 gns., was bred by Mr. R. Wemyss Honeyman, Derculich, Strathtay.

ABSTRACTS

[Tuberculin Test in Guinea-pigs and Cattle: the Allergic Responses of Animals to Tuberculin and to Extracts of Non-pathogenic Acid-fast Bacteria. Canham, A. S. (1944.) *Onderstepoort J.* **19.** 29.]

The author gives a comprehensive review of the literature relating to the development and application of the tuberculin test. The work reported in this paper is concerned with investigations to elucidate the cause of "no lesion" reactors.

In 1934, in an attempt to explain the cause of non-specific reactors experienced in the course of testing animals in the Union of South Africa by means of the double intradermal test, the author carried out experiments to find out whether saprophytic acid-fast organisms, types of *M. tuberculosis, Br. abortus,* Preiz Nocard organism and unidentified diphtheroids could cause sensitisation in guinea-pigs to tuberculin prepared from human or bovine strains of *M. tuberculosis.* Guinea-pigs inoculated by subcutaneous and intraperitoneal routes with BCG in an oily base gave marked local reactions—those injected with *M. tuberculosis,* avian and human types, slight reactions, and those treated with *Br. abortus* gave definite reactions. No sensitivity developed following injection of the Preiz Nocard bacillus and *C. pyogenes,* while that following injection with non-pathogenic acid-fast organisms was very low.

Extracts similar to tuberculin were prepared from the non-pathogenic acid-fast bacteria (*M. phlei, M. butyricum* and *M. smegmatis* and tested on guinea-pigs inoculated with all the above organisms. Reactions occurred in pigs infected only with saprophytes, while no response occurred in those infected with *M. tuberculosis.* These extracts appeared, therefore, to elicit a specific response only when tested against members of their own group.

Similar experiments were performed on 13 calves. After being divided into two groups they were injected with large doses of *M. butyricum* and *M. phlei* respectively. On testing with extracts of these organisms in 47 days, marked sensitivity had developed, but when subjected to a tuberculin test some 16 days later, none of the animals gave an unequivocal positive reaction.

The author concludes with the following statement: "To sum up, one would say that the tuberculin reactions given by the calves sensitised by *M. phlei* and *M. butyricum* would be negative if judged solely on clinical appearance. If judged by clinical appearance plus measurements they would be regarded as suspicious, while finally, if measurement alone was the criterion they would be classed as positive."

S. J. E.

* * * * *

[Further Experiments on Lactation in Thyroidectomised Rats: The Role of the Parathyroids. Folley, S. J., Watson, H. M., and Amoroso, E. C. (1942.) *J. Endocrinol.* **3.** 178-191.]

Folley and co-workers confirm their previous finding that, in the lactating rat, thyroidectomy causes an almost complete cessation of lactation. They also reaffirm that, although thyroidectomised females will mate and deliver young, satisfactory lactation is rarely established. In such animals, pregnancy is often prolonged and acute tetany occurs at the approach of parturition unless parathyroid hormone is given. They point out that since parathyroid tissue is embedded in the thyroid of the rat, thyroidectomy must also involve the removal of parathyroid tissue. Confirmation on this point was obtained from the results of replacement therapy with parathyroid hormone. It is concluded, therefore, that failure of lactation after thyroidectomy in this species is due, at least in part, to parathyroid deficiency.

Since the surgical removal of the thyroid in the rat also involves the removal of parathyroid tissue, the operation appears to produce a condition of latent parathyroid deficiency which is exacerbated to acute tetany under the stimulus of approaching parturition, but is not evoked when thyroidectomy is performed during established lactation. This tetany of parturition is thus in some respects similar to milk fever in the parturient cow, and on this analogy the tetany induced in rats by approaching parturition may be explained by the increased demands for serum calcium which cannot now be fully met from the calcium reserves owing to removal of part of the parathyroid tissue during thyroidectomy. Moreover, as has already been indicated, this tetany can be prevented by the administration of comparatively small amounts of parathyroid hormone. This indicates that the condition is of a temporary nature, whereas the post-operative lactation failure can only be relieved, and then only partially, by considerably larger doses of parathyroid hormone repeatedly administered.

N. J. S.

Questions and Answers

"Questions and Answers" will be published on alternate weeks.

The submission of questions for inclusion in this column will be welcomed. They can relate to any aspect of veterinary work and where publication of the name of the enquirer is not desired, a pseudonym should be supplied, the name and address also being given.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Caesarean Section in the Cow

Q.—*I would be glad of information in regard to Caesarean section in the cow. In particular, should the uterus be sutured? Should the membranes be removed—both in the case of full-time calves and when removed prematurely?*

Also, is it necessary to suture the peritoneum? It seems to me that without suturing in a premature case the cow is liable to die from uterine haemorrhage and it is impossible to remove placenta as it is firmly adherent.—R.M.

A.—Caesarean section as a premeditated operation involving interference with a healthy uterus and closed cervix is not frequently performed in this country. In the immense majority of cases the operation is for the relief of dystokia with a patent cervical canal, possible uterine contamination or even sepsis and frequently secondary inertia.

In the questioner's "premature case" extraction of the foetus results in rapid involution of the uterus. Haemorrhage from the uterine incision is negligible. Removal of foetal membranes is generally not difficult and again there is little haemorrhage. If, however, removal results in the tearing away of uterine caruncles the membranes must be left. In most cases they are voided per vagina within 24 hours. Closure of the uterine incision contributes little to the control of haemorrhage but should be made in the best interests of surgery.

When the operation is performed at full term it is not always possible to remove the membranes in their entirety. In some cases, particularly where there is uterine inertia, despite the use of posterior pituitary, the foetal membranes are not expelled for several days. In the meantime uterine sepsis must be controlled. Repair of the uterine wound is essential.

Irrespective of the site of the incision through the abdominal wall, the peritoneal wound should be sutured. This generally means the inclusion of the transversalis abdominis muscle or fascia. The incisions in the oblique muscles and skin are closed as one by means of eversion sutures using half inch tape.

Acute Conjunctivitis in Cats

Q.—*Can any practitioner recommend palliative treatment for acute conjunctivitis, which I find very prevalent in young cats? The usual remedies give little relief.—"Georgius."*

A.—The writer has not experienced great difficulty in the treatment of conjunctivitis in cats so far, but agrees that at times this condition does seem to assume epidemic proportions. In any case of acute conjunctivitis the most efficacious measure in the early stages is the instillation into the eyes of a few drops of liquid paraffin two or three times daily; this very simple method is, in the writer's experience, far superior to any of the local anaesthetic preparations for the relief of the irritation and pain so marked during the first 48 hours. When this acutely painful phase has passed treatment with collosol argentum (diluted in equal parts with aq. dest.) is usually successful. Nizin (Burroughs Wellcome) used in a dilution of one tablet of 4 grs. to 4 oz. aq. dest. is a valuable alternative. Even cases in which there has been gross oedema of the conjunctivae have usually responded to these lines of treatment.

Vitamin A has been used in a variety of eye conditions and has been found useful. A good brand of halibut liver oil may be applied topically or orally in doses of m. iii once or twice daily.

The Vermiform Appendix

Q.—*Recently I attended a ram with dysuria due to urethral obstruction by calculi in the vermiform appendix. I was not allowed to remove this latter structure because, according to the owner, it would render the ram sterile.*

Is there any evidence, experimental or otherwise, to show that the removal of this appendage contributes in any measure to sterility in the ram?—"Stoney."

A.—The only experimental evidence concerning the effect of removing the vermiform appendix in the ram appears to be that of Ivanow (*Vet. J.* **85**. 351-355. 1929). The results published by this worker show quite conclusively that after amputation of the appendix in five rams there was no decrease in their fertility. Opinion amongst practical sheepmen in this country is conflicting, but since many reputable breeders have stated that removal of the appendix does not result in a smaller lamb crop one may deduce that the commonly held impression that this operation results in sterility or lowered fertility is erroneous. It is possible that bad surgical technique or careless removal of the organ may indirectly affect fertility.

It is certain that the function ascribed to the vermiform appendix by Marshall in his classic book, "The Physiology of Reproduction," where he states that this organ is inserted into the os uteri during copulation, is wrong. Quinlan and co-workers in S. Africa have shown that spermatozoa are not deposited in the uterus at normal copulation, though they may be found in the cervix uteri within 15 minutes of service. Gunn in Australia, during the course of experiments in which ejaculation was induced by an electrical stimulus, observed very definite movements of the appendix, the free end of which rapidly described a circle and so effected a very complete scattering of the ejaculum, which at a distance of one foot was spread over nearly a square yard if the penis was held in the open. Gunn concludes that it appears likely that the function of the urethral process is to thoroughly distribute the spermatozoa round the external uterine opening.

Spinal Paralysis in the Dog

Q.—*What is the cause and treatment of spinal paralysis as met, chiefly in dachshunds and pekes?—P.S. and R.P.M.*

A.—Much depends upon the diagnosis, which in Pekes may quite well be calcification of the intervertebral discs; but it may, of course, be spinal myelitis, concussion or haemorrhage, etc.

The condition must always be regarded as serious for several obvious reasons, but in general one can say of prognosis that (1) functional disorders are more favourable than organic; (2) that flaccid paraplegias tend to run a quicker course either towards death or recovery, than do rigid paraplegias; and (3) that unfavourable signs are bed sores and the implication of the bladder and rectum. Any complication such as pneumonia or cystitis adds gravity to the prognosis. A long protracted case will almost certainly have to be destroyed unless the nursing is efficient and unremitting, as no other canine disease warrants or demands so much attention as paraplegia.

As a first step to treatment, endeavour to find and remove the cause. Take all necessary measures to prevent complications, the chief measure being the turning of the dog every two hours from one side to the other to prevent hypostatic pneumonia. With incontinence, or retention with overflow, the skin will be continuously wetted with urine. It becomes excoriated or scalded and hair falls out. This necessitates constant washing, drying and powdering. The dog meanwhile should be bedded on thick pervious material such as wheat straw through which urine will percolate away. Laxatives or paraffin, and even enemas will probably be needed.

If there is urinary retention, it may become imperative to catheterise the dog, of course adopting the strictest aseptic precautions. If inflammation of the cord is suspected, belladonna may be given with benefit. Full doses of pot. iodide are beneficial in promoting absorption of inflammatory products. One may prescribe a mixture containing sod. salicyl, grs. v, pot. iod., grs. iii, tinct. nux vom., m. v, aqua to drams ii: this dose to be given twice daily and alternated weekly with Donovan's solution m. v and sod. sal., grs. v—also twice daily.

In cases of congestion or myelitis, nux vomica, opiates and galvanism should be avoided, but counter irritation may be substituted. The latter may consist of hot fomentations, friction, mustard, or even a blistering ointment. For acute myelitis, ice to the spine and the subcutaneous injection of atropine is a useful line of treatment, combined with all measures for combating bed sores.

For chronic meningitis and the compression paraplegias, the iodides or atropine may be tried, but counter irritation is best. Massage of the spine and leg muscles with an electric vibratory apparatus is very useful.

If and when improvement seems to have set in, the process may be hastened by short applications of a galvanic current, say, for five minutes daily, later giving an additional five minutes of faradism.

Massage should be continued and the animal should be induced to put weight on its legs. This is done by slinging it in a towel passed under the abdomen in which the animal's weight is supported by an assistant.

The diet should be liberal and nourishing, containing cream and fats; and nerve tonics such as strychnine, phosphorus or arsenic combined with cod-liver oil, iron, quinine are all valuable in promoting nutrition.

The vitamin B complex has been successful in some cases of nervous degeneration and should not be overlooked among the possible forms of treatment.

R.C.V.S. MEMBERSHIP EXAMINATIONS

List of Successful Candidates
(Concluded)

Dublin

FIRST YEAR:

Corr, John	McCauley, P. J.
Loughran, P. K.	

SECOND YEAR:

Burke, J. T.	
Devlin, O. K.	Maguire, C. G.
Farrell, Joseph	O'Byrne, E.
Ferguson, Miss M. D.	Roe, P. F.
Jennings, R.	Ryan, P. J. (H)
Kavanagh, Desmond	Walker, D. A.
Layng, J. E. (H.)	Woods, R. H.
McGovern, G.	

(H) Denotes credit in Histology, etc.

THIRD YEAR:

Brown, Samuel	McCaughey, R. M. (H)
Byrne, J. J.	McKinstry, Miss E. P. B. (P) (A)
Byrne, P. J.	
Conlon, P. K.	*Maybin, Richard
Curtis, R. G. (A) (H)	O'Dee, M. J.
Dodd, Luke	O'Leary, Harry (A) (H)
Henigan, M. J. (A)	O'Neill, J. B. (H)
Hickey, T. F.	O'Riordan, John (A) (H)
McAulfield, R. J.	Thornton, Edward (A)
McCarthy, James	Twomey, M. (A)
McCarthy, J. K.	*Wiltshire, F. H.

* Denotes Second Class Honours.
(P) Denotes credit in Pharmacology.
(A) Denotes credit in Anatomy.
(H) Denotes credit in Hygiene.

FOURTH YEAR:

Burgess, S. R.	Loughlin, E.
Canavan, R. J.	McBride, P. S.
Cooney, John	McGuinness, T. P. H.
Corcoran, C. J.	Molloy, P. F.
Cosgrove, J. F.	O'Brien, W. B.
Curtain, Sean	Owens, C. P.
Gavagan, P. B.	Power, P. N.
Harbison, J. T.	Ross, J. K.
Kealy, B. A.	

FINAL YEAR:

Black, R. A.	Gleeson, Eugene
Casey, P. M.	Harris, K. A.
Clarke, A. R. L.	Hobson, Johannes
Cooper, R. J.	Kay, E. D.
Corridan, Maurice	McCarroll, J. J.
Craig, S. A.	Mullin, W. J.
Fay, T. G.	Murphy, Laurence
Fitzpatrick, Daniel	Wall, Brian

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Jan. 24th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonington, 2 p.m.

Jan. 26th.—Annual General Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

* * * * *

R.C.V.S. Council Election, 1945

The following members are due to retire in 1945, but are eligible for re-election if nominated:—

Date of First Election.	
1938	Professor T. Dalling.
1934	Mr. H. W. Dawes.
1938	Mr. T. Wilson.
1942	Mr. S. J. Motton.
1942	Mr. W. R. McKinna.
1944	Mr. J. D. Peele.
1938 / 1944	Mr. R. E. Glover.

Nominations for election or re-election must be submitted not later than Tuesday, May 8th. The election will take place at the Annual General Meeting on Tuesday, June 5th, 1945.

PERSONAL

New Year Honours.—In the second list of New Year Honours, issued on Wednesday of last week, the award was announced of the M.B.E., for civil defence duties, to Mr. Charles George Strachan, M.R.C.V.S., Veterinary Officer, Ministry of Agriculture.

Marriage.—BUXTON—SKENE.—On January 3rd, 1945, at St. John's Church, Pittenweem, Captain David Grant Buxton, the Middlesex Regiment (Duke of Cambridge's Own), only son of Mr. and Mrs. F. G. Buxton, of Highgate, London, to Diana Mildred, widow of Major N. R. M. Skene, Royal Marines, and daughter of the late Sir Thomas Erskine, BT., and Lady Erskine, of Cambo, Kingsbarns, Fife.

Veterinary Educational Trust.—Mr. W. F. Davison, M.R.C.V.S., has relinquished his appointment at the Midland Agricultural College to take up a Research Fellowship with the Veterinary Educational Trust.

R.C.V.S. OBITUARY

HILLIARD, James Joseph, O.B.E., Major R.A.V.C. (R.O.), Lumville, The Curragh, Co. Kildare. Graduated Dublin, July 21st, 1908. Died December 9th, 1944; aged 57 years.

Major J. J. Hilliard, O.B.E., M.R.C.V.S.

A PERSONAL TRIBUTE

Major James J. Hilliard, O.B.E., who died at The Curragh, Co. Kildare, Ireland, on December 9th, 1944, was amongst the most popular and widely known of our soldier-riders in India before the Great War. Son of Mr. William Hilliard, a well-known trainer, and grandson of Ireland's "grand old man" of the horse trade, James Daly of Liffey Bank, it would have been odd indeed if "Tibet" Hilliard was not a horseman and a judge. What memories the names of Daly and Hilliard bring back to many of us! James Daly, of Liffey Bank, was known and respected by every hunting man in England and as well known in the racing world. Hartstown, Clonsilla, where Hacklore, Succoth, Enthusiast and Bushey Park were at stud, and many of the famous mares of their day, produced the winners of many of the classic races in Ireland and not a few in England.

Born and bred in that atmosphere, "Tibet," who qualified at the Royal Veterinary College of Ireland in Dublin in 1908, did not have to go to see practice in the vacations. He knew what was a sound horse when he was still a boy. These were not the days of small-animal practice and with his early experience he quickly qualified to be a veterinary surgeon who knew his job. But it was not as a veterinary surgeon that he became famous. When he went to India in 1908 he was posted to the 8th Hussars, where it was his good fortune to come in contact with the great sportsman, Bryan Mahon. Soon he was riding for the stable, trained at that time by an equally well-known race and polo man—Major "Rattle" Barrett. A natural sportsman of great strength and game as they are made, cheerful and carefree always, was it any wonder "Tibet" soon became the most popular soldier-rider in India? Built on "up to a bit of weight" lines he never had the opportunities of showing what he could do against such artists as Micky Furnell, Tim Eivers and Ormon Winter on the flat. Had his weight permitted it, I have no doubt he would have been quite able to hold his own. He would have matched their artistry with his vigour and dash. However, over the fences at that time he had no equal, and I am sure it was the day of his life when he won India's "Grand National" at Tollygunge.

In the last war he served in Italy and France; he was mentioned in despatches and awarded the O.B.E. Returning to India he was invited by the Calcutta Turf Club to be their official veterinary surgeon—and that is where he became even better known and loved. He was in his element there. With his job he combined ownership and a good bit of trade. Like James Daly, he was respected and trusted: owners knew he would supply the right horse. Many he raced and bred himself, for all the time he kept some of the old Hartstown-bred mares at stud in Ireland—the Ayn Hali and Lalla Rookh strains. They usually raced for a season in Ireland before going to Calcutta. There they were looked after and trained by his brother, Bill, than whom no one could get a two-year-old better and fitter. Bill would have one or two "ready" for "Tibet" when he came home every summer for a short holiday and to get another shipment ready.

"Tibet" arrived back in Ireland early last summer very ill. I am sure he knew his number was in the frame, but, game to the end, he would not admit it. All the time he talked about going back to India and even had a batch of horses ready to go with him.

Dear old "Tibet"! All who knew him loved him and will feel themselves the poorer for his loss. E. C. D.

POULTRY (STOCK IMPROVEMENT) ADVISORY COMMITTEE

The Minister of Agriculture and Fisheries has constituted a Poultry (Stock Improvement) Advisory Committee to keep under

review the position of the stock producing and distributing sections of the industry, to advise on existing measures designed to encourage the production of high quality breeding stock, and to suggest from time to time any further steps which they would consider it desirable to be taken to secure that end.

The Chairman of the Committee is Sir Donald Vandepeer, K.B.E., Second Secretary of the Ministry of Agriculture and Fisheries. The Vice-Chairman is Mr. P. A. Francis, O.B.E., and the other members are:—

Mr. H. D. Barley, Mr. G. G. Belfield, Mr. H. F. Bliss, Captain S. W. Clift, Mr. D. T. Davies, Captain E. Dodds, The Rt. Hon. Lord Greenway, Mr. C. Hedderwick, Mr. J. Kemp, Miss E. E. Kidd, Mr. G. R. H. Nugent, J.P., Mr. Gordon Saunders, Mr. B. Stansfield, Mr. T. A. Stephens, Mr. Gordon Stewart, Mr. S. Street-Porter, J.P., Mr. J. Sutton, Mr. T. H. Turney, Major H. E. Whaley, J.P., Dr. W. R. Wooldridge, PH.D., M.R.C.V.S.; with, as secretary, Miss V. C. Lawe, Ministry of Agriculture and Fisheries, Africa House, Kingsway, W.C.2.

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE MONTH ENDED DECEMBER 31ST, 1944

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
ENGLAND					
Bedford	1	43	44	1,023	564
Berks	—	105	105	3,553	2,208
Bucks	1	96	97	3,216	1,793
Cambridge	—	14	14	344	208
Chester	1	411	412	13,490	4,595
Cornwall	—	4	4	72	75
Cumberland	—	65	65	1,618	1,411
Derby	4	337	341	9,753	5,510
Devon	—	284	284	4,263	2,551
Dorset	—	70	70	2,160	1,145
Durham	1	286	287	6,323	2,173
Essex	—	257	257	9,172	5,351
Gloucester	1	102	103	3,043	1,786
Hampshire	2	402	404	11,200	7,430
Hereford	—	24	24	339	221
Hertford	—	78	78	2,344	1,444
Hunts	—	13	13	475	302
Isle of Ely	—	3	3	83	75
Isle of Wight	—	14	14	252	127
Kent	4	158	162	4,053	2,349
Lancs	2	205	207	5,862	1,840
Leics	2	102	104	2,630	1,829
Lincs (Holland)	—	3	3	25	11
Lincs (Kesteven)	—	25	25	337	149
Lincs (Lindsey)	1	106	107	2,046	1,171
Middlesex	—	16	16	641	307
Norfolk	3	195	198	5,944	4,083
Northants	—	86	86	2,402	1,836
Northumberland	1	68	69	2,349	1,126
Notts	—	165	165	3,663	2,204
Oxford	—	43	43	1,269	1,144
Rutland	—	8	8	138	91
Salop	—	278	278	8,472	4,056
Soke of Peterborough	—	1	1	37	31
Somerset	5	245	250	6,546	3,023
Staffs	1	219	220	6,460	3,421
Suffolk, E.	—	100	100	2,308	1,691
Suffolk, W.	—	51	51	1,054	631
Surrey	1	110	111	3,175	1,448
Sussex, E.	1	178	179	4,543	2,578
Sussex, W.	—	120	120	3,312	1,980
Warwick	—	140	140	3,454	2,130
Westmorland	—	14	14	414	506
Wilts	—	96	96	3,905	1,835
Worcester	1	158	159	3,310	1,521
Yorks, E.R.	1	107	108	1,672	962
Yorks, N.R.	—	117	117	2,351	1,442
Yorks, W.R.	—	270	270	6,552	2,562
WALES					
Anglesey	—	48	48	836	611
Brecon	—	9	9	119	108
Caernarvon	—	114	114	1,780	974
Cardigan	1	32	33	611	412
Carmarthen	2	242	244	4,340	2,217
Denbigh	—	61	61	1,360	653
Flint	1	118	119	2,619	1,158
Glamorgan	1	104	105	1,755	689
Merioneth	—	10	10	125	68
Monmouth	—	55	55	1,325	775
Montgomery	—	15	15	296	222
Pembroke	—	85	85	1,647	1,715
Radnor	—	—	—	—	—
TOTALS	39	6,885	6,924	178,460	95,988

Notes.—(1) Operative periods of undertakings: 1 year, 1,297; 2 years, 615; 3 years, 5,012. (2) Undertakings renewed for a further period: 1 year, 775; 2 years, 148; 3 years, 136. (3) Undertakings not renewed at end of operative period, 485. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for a further period.

Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	1	19	20	801	223
Angus	—	21	21	838	395
Argyll	—	6	6	113	115
Ayr	—	36	36	1,140	861
Banff	—	4	4	121	42
Berwick	—	2	2	53	22
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	5	5	201	218
Dumfries	—	13	13	705	581
Dumbarton	—	3	3	105	86
East Lothian	—	3	3	145	88
Fife	1	35	36	1,349	606
Inverness	—	9	9	346	191
Kincardine	—	4	4	195	126
Kinross	—	3	3	59	32
Kirkcudbright	—	16	16	954	700
Lanark	—	20	20	688	501
Midlothian	—	1	1	44	69
Moray	—	—	—	—	—
Nairn	—	1	1	14	—
Orkney	—	—	—	—	—
Peebles	—	2	2	28	16
Perth	—	32	32	720	427
Renfrew	—	7	7	277	201
Ross-shire	—	3	3	89	65
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	28	28	841	670
Sutherland	—	4	4	76	66
West Lothian	—	1	1	23	18
Wigtown	2	19	21	1,316	684
Zetland	—	—	—	—	—
TOTALS	4	297	301	11,241	7,003

Notes.—(1) Duration of undertakings: 1 year, 36; 2 years, 21; 3 years, 244. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 31; 2 years, 5; 3 years, 6. (3) Undertakings expired and not renewed (not included in column II of statement): 84. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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NATIONAL AGRICULTURAL ADVISORY SERVICE

Following on the recent appointment of Mr. J. A. Scott Watson as Chief Education and Advisory Officer to the Ministry of Agriculture and Fisheries, the Minister, in preparation for the setting up of a National Agricultural Advisory Service, has appointed the following as Senior Education and Advisory Officers from January 1st, 1945: Mr. F. Rayns, O.B.E., M.A., Mr. W. K. Slater, D.SC., F.I.C., and Mr. H. V. Taylor, C.B.E., D.SC., A.R.C.S., V.M.H.

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FOOT-AND-MOUTH DISEASE

Since the commencement of the year, orders restricting the movement of animals within areas "declared infected" have been made by the Ministry of Agriculture in consequence of the confirmation of the existence of foot-and-mouth disease at the following centres: January 1st—Paddington (London); January 3rd—Preston (Lancs.), Mildenhall (Bury St. Edmunds, Suffolk); January 5th—Hythe (Southampton), and Birdlip (Gloucester).

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SCAB DRIVES SHEEP FROM THE BLACK MOUNTAINS

As a result of a serious outbreak of sheep scab, the Black Mountains—running from Breconshire, through Herefordshire, into Monmouthshire—are to be cleared of all sheep, states the *Farmers' Weekly*. "Ministry officials, police and farmers are faced with a tremendous task, for the Black Mountains with their many ridges and valleys are the rough grazing ground for more than 40,000 sheep. All these sheep have to be rounded up and driven down the mountain sides to farms in the valleys where arrangements are being made to dip them."

Strong representations to the Ministry of Agriculture for the imposition of a double dipping order in the Black Mountains were made by Herefordshire Diseases of Animals Committee at a recent meeting.

The Committee heard comprehensive reports on the position from the Deputy Chief Constable, Mr. G. T. Brierley, and the Ministry's Divisional Veterinary Inspector, Dr. A. J. Wilsdon, in which the difficulties caused by the fact that the disease had broken out on the mountains where sheep ran without fencing were emphasised. Dr. Wilsdon said that these were the first outbreaks of sheep scab to occur in the county for 11 years.

IMPRESSIONS OF BRITISH FARMING

Mr. G. A. Holmes, one of the three New Zealand agriculturists who were lent by their Government to help our home food production, speaking at a conference at the Ministry of Agriculture before the party returned home, said that marketing, drainage, farm education, costing, and farm water supply were all departments of agriculture in which Britain was behind the times. "There is a job for 1,000,000 men after the war to get water on to farms. In Wiltshire I found that five local bodies had to be consulted before drainage alterations could be made."

Mr. A. Johnson, animal husbandry officer, said that the top class of British livestock was the best in the world, but there seemed to be no middle class. The quality of ordinary commercial livestock was very low.

The three New Zealanders said that not all their impressions of British agriculture were unfavourable. They had learned much about flax production and livestock diseases and had been impressed by the care which the British farmer gave to his livestock all the year round.

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BEEF PRODUCTION PROBLEMS

Addressing the January meeting of the Farmers' Club, Mr. John H. Everall said that he thought it was generally recognised that our commercial cattle stocks were at present of a deplorably low standard. The reasons for this were: (1) The lukewarm attitude (during the past) of the Ministry of Agriculture to the breeding of high-class cattle and the indifference of the Ministry of Food to the production of high-class beef; (2) The traditional bias of the average English farmer against pedigree stock; (3) The high incidence of disease among herds in this country in recent years; (4) The totally indiscriminate crossing practice which has become so prevalent, and (5) The economic factor.

We had an excellent example in the first case in the sudden repeal at the outbreak of war of the Licensing of Bulls Act, and, shortly afterwards, the withdrawal of the subsidy for bulls under the Livestock Improvement Scheme. Fortunately, these somewhat irresponsible decisions of the Minister of that period were, largely he thought, due to the influence of the Breed Societies, reversed shortly afterwards, but nevertheless these actions proved his point. He might also add that the lack of encouragement given by the Government to the export trade, surely one of the greatest incentives to improvement of livestock in this country, could hardly be described as farseeing. He suggested that the high standard of our pedigree beef breeds, Aberdeen Angus, Beef Shorthorn and Herefords, had largely been due to the exacting demand of the export market. Further, we had the Ministry of Food awarding a premium, it was to be hoped for the duration only, to bad beef cattle.

This, then, had been the position in the past. We could, however, in this connection, look to a better future, thanks to Mr. Hudson—perhaps the most livestock-conscious Minister of our time, whose persistent efforts had culminated in a well-conceived Licensing Scheme that could but have very beneficial effects on our cattle-breeding policy.

The high incidence of disease among herds in this country in recent years was almost entirely due to the trading through market channels of infected stock. The U.S.A. had apparently largely rid their country of disease by paying compensation for diseased animals, and as the most persuasive method with farmers, and no doubt with most people, was through their pockets, some such scheme might be introduced with advantage here. He would suggest that beef breeders be given the same incentive as milk producers with regard to the scheme for voluntary vaccination and the Attested Herds scheme (the subsidy for which was withdrawn from beef herds at the outbreak of war).

There was no doubt that the indiscriminate crossing practice was one of the principal reasons for the present-day condition of our cattle. His own opinion was that this had been in some measure brought about by the dual purpose theory. In his view the breeding of dual-purpose cattle was a dangerous practice which should only be indulged in by experts. He did not mean to suggest almost eliminating the dual-purpose breeds themselves, but that they should largely convert themselves into a single-purpose breed, either for beef or for milk. The great beef-producing countries of the world (*e.g.*, Argentina, probably the greatest of them all) concentrated entirely on either beef or milk. No matter how exacting our livestock officers might have been in passing bulls for licensing purposes in the past, if you put the best Hereford bull in the country on to the best Ayrshire cow the result would be a scrub-beast—probably no use for either beef or milk. Mr. Hudson's new licensing proposals should dispense with this short-sighted practice completely.

The Future

The only way, in his opinion, to breed really good beef was to breed them from beef cattle. Why was Argentine beef better than ours? Why were Eire's store cattle better than ours? Possibly this applied also to those of Australia, Canada and New Zealand. He submitted it was because they did not mix their types. They bred for beef or for milk and did not try to do both—but this was where the subject had an unsatisfactory solution. We could not in this country compete with them. We had nothing like sufficient area to cater for this country's beef requirements.

It had, as a consequence, during the past 50 years in any event, always paid much more handsomely to produce milk than beef.

What, then, was the answer and where could we get good beef? There would always be in Scotland, Wales and some parts of England certain areas where milk selling, owing to the inaccessibility of the farms, would not pay. He used the word inaccessibility deliberately. We so often heard that it would only pay to breed for beef on marginal land. Unless he misinterpreted this word, he would say that this statement was incorrect. It would still pay better to keep a dairy cow on a hillside outside a city rented at 5s. per acre than breed and rear a beef calf, assuming transport was available to collect the milk. In the same way best quality land which would keep two dairy cattle to the acre would also keep two beef cattle and their calves, but if the farm was accessible milk would still be the obvious answer. There would, then, always be a small supply of good beef to be obtained from these small areas of inaccessible farms, but this would not go very far.

Where were we to obtain the rest for our large arable feeding farms? Either from Eire, as in the past, or from our dual purpose cows. Personally, he would prefer to feed beef himself as he had done in the past from the former. They must always be superior to our own dual-purpose bred store cattle—derived from low-yielding type dairy cows and sired by colour-marking beef bulls, and in any case would these particular dairy cows always be available? His view was that the excellent policy of our Ministry as at present laid down would in time dispense entirely with this class of cow kept at present for rearing these calves. That might not be for some years. A few years ago Dr. John Hammond wrote: "If beef cows could be induced to give twins, which is now within range of scientific possibility, commercial production might be extended." Perhaps by the time we were rid of these low-yielding type dairy cattle the learned Professor would have perfected this science to the extent that artificial insemination had arrived to-day. This surely would be the answer. He thought the beef cow would be able to keep the two calves.

Artificial Insemination

In his opinion the value of artificial insemination to the beef production in this country could be summarised in one word—nil. The beef production of this country must naturally ultimately depend on the pedigree beef breeders. Their point of view on the subject seemed to be generally misunderstood as it was essentially different in outlook to that of a dairy cattle society. A pedigree beef cattle breeder kept his cattle for one primary purpose—the production of bulls. Artificial insemination meant, of course, a considerable reduction in the number of bulls required, and it did not require much intelligence to follow the sequence to its logical conclusion should beef bulls be extensively used for this purpose—a considerable reduction in the number of pedigree beef herds and with much fewer blood lines available, the difficulty amongst the few remaining herds of finding new stock bulls sufficiently unrelated to keep their own stocks vigorous—the resultant decrease in income of the breed societies concerned—the possibility of their winding up—not perhaps of vital importance to the country but finally and surely a national disaster—the extinction of the breed itself. This might seem to be exaggerated to absurdity but it illustrated his point, and he wondered if it was then a really selfish outlook as was so often suggested.

Apart from this what object did it really serve to send a beef bull to an artificial insemination centre? What purpose could a 400, 500 or 600 guinea bull serve at a centre to be used on low type dairy cows to produce bobby or veal calves or even rearing calves worth 30s. or 40s.? Surely the purchase by the farmer of a 35 or 40 guineas crossing bull of any beef breed would be more suitable. It would be far less trouble to these herd owners to buy a good beef bull and they would get just as good calves. In any case what was wrong with using the scheme bull? It was much cheaper than insemination.

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MINISTRY OF AGRICULTURE NEWS SERVICE

Co-operation Against Mastitis.—It cannot be too strongly emphasised that the approved methods of control of animal disease for herds under the panel scheme call for a high degree of co-operation between the farmer and his veterinary surgeon. In the case of mastitis there are seven things the farmer should do. He should examine the milk of each cow daily by using a strip cup; segregate so far as practicable infected animals; milk non-infected animals first; ensure thorough cleansing and disinfection of milkers' hands and milking machines before and during milking; milk and strip

carefully; report immediately the occurrence of any acute cases to his veterinary surgeon and inspect dry cows and heifers at regular intervals for early recognition of "summer mastitis."

The veterinary surgeon, for his part, will examine all cows at quarterly intervals and pay such other visits as may be necessary for control and treatment. He will also enlist, where necessary, laboratory aid to determine the type of infection. At the end of the lactation period, or when otherwise necessary, he will treat each affected cow by irrigation of the udder with an acridine dye and also supply sulphanilamide for the treatment of suitable cases and supervise generally the preventive measures taken by the farmer.

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Healthy Stock—More Milk and Meat.—At the outbreak of war it was realised that the production of milk and meat in Britain would have to depend mainly on home-grown feeding-stuffs. The production of these essential foods meant not only keeping as many animals as possible, but keeping them in good fettle. The wastage of milk and meat through disease was shown, by a preliminary survey, to run into millions of gallons and thousands of tons of meat a year. Sterility, mastitis, contagious abortion and Johne's disease were mainly the cause. In July, 1942, a panel scheme was introduced by the Ministry of Agriculture in co-operation with the National Veterinary Medical Association and the National Farmers' Union, and veterinary surgeons agreed to accept a certain scale of annual charges for inspecting and treating herds. In November last there were in England and Wales over 273,000 cows and heifers receiving regular veterinary inspection. This scheme not only provides short-term control measures to meet the present need for maximum milk and meat production, but if carried on from year to year will do much to eradicate disease from the herds of this country.

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British Cows Milk Well in War-time.—The feeding of dairy cows has undergone a radical change and farms are now largely self-supporting in feeding-stuffs, oats and beans being grown to replace the imported cake of pre-war days. Nevertheless, as has been shown by recently published statistics of sales of liquid milk, cows have milked well although the average production per cow under these changed conditions has fallen somewhat. The average yield is, of course, influenced by the fact that many cows not of true dairy type are now being used for milk production to meet the vastly increased demand. This points to the need for better breeding of dairy stock if the steadily expanding demand for milk is to be met.

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An Annual Review of Agriculture.—We are all familiar with Mr. Churchill's "grand inquest on the nation" which is held in Parliament from time to time to report progress on the war fronts. Something on these lines is now to be held on agriculture every February to examine accounts for some thousands of typical farms of different sizes and types all over Britain, and statistics of costs of production. By agreement with the industry the information is being collected mainly by Advisory Economists attached to agricultural colleges and the universities. The object of the annual February review will be to enable the Government in consultation with the National Farmers' Unions in England and Wales, Scotland and Northern Ireland, and the Farm Workers' Unions, to consider in detail the financial position of the industry, and then to fix prices for farm products. . . . Already the Government have announced their desire to encourage a substantial increase in milk production and a revival in the rearing of cattle and sheep for meat production. Farmers have, therefore, an assured market and guaranteed minimum prices for milk, fat cattle, sheep, lambs and calves. A market will also be assured throughout the four-year period for all fat pigs and eggs that are offered for sale and it is the Government's intention to encourage an expansion of production of these commodities to the fullest extent permitted by the supplies of feeding-stuffs that can be made available. Prices will be considered at each annual February review and subsequently fixed by the Government. The Government recognise that in the event of an important change in the situation, such as might arise from a sudden and substantial change in costs, it may be necessary to convene a special review.

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Rye Grass and Mixed Grazing.—Pastures consisting largely of rye grasses often deteriorate quickly. The rye grass plants are prone to run to seed and if they are allowed to continue this course will die from exhaustion, their place being taken by inferior grasses. This deterioration is most marked on poor land used exclusively for sheep grazing. If cattle are mixed with the sheep, better control of the pasture is established and its stock-carrying capacity is increased. In the north it has been found that a system of mixed grazing as compared with sheep alone nearly doubled the stocking capacity of such land.

SULPHONAMIDES, EGGS AND ENZYMES

"The many pharmacological studies which have now been made of the sulphonamides demonstrate the impressive variety of their actions—many of them undesirable in chemotherapy," says the *Lancet*, and continues: "One is of especial interest because a definite biochemical mechanism can be assigned to it. Some sulphonamides lower the carbon-dioxide-combining power of blood. Mann and Keilin[1] ascribed this action to the inhibition of carbonic anhydrase, an enzyme present in animals' cells which catalyses the reaction $H_2CO_3 = CO_2 + H_2O$. Sulphanilamide (2 to 3 g. daily) can inhibit the enzyme sufficiently to interfere with the excretion of carbon dioxide from the lungs of normal men performing strenuous work, though its effects are not seen in subjects at rest.[2] A more striking effect, though not one of clinical concern, has now been observed to follow the sulphonamide inhibition of this enzyme. Some sulphonamides, when fed to domestic fowls, caused their eggs to be laid without shells. The hens were not otherwise affected. It had been suspected from the high concentration of carbonic anhydrase in tissues of the hen's oviduct that this enzyme functioned in the formation of the calcium carbonate of the shell. The experiments of Benesch, Barron and Mawson[3] prove this function exists. That the sulphonamide acts by inhibiting carbon anhydrase is confirmed by the specificity of the effect, which is limited to certain sulphonamides only; the compounds exhibiting it are not all anti-bacterial. The actions on purified carbonic anhydrase[1] and on egg-shell formation were shown only by sulphonamides with unsubstituted $-SO_2NH_2$ groups; not that is to say, by sulphapyridine. Hens dosed with this compound yielded normal eggs. The effects on eggs and the enzyme are shown by compounds lacking the nuclear $-NH_2$ group, which is necessary for the normal anti-bacterial action of the drugs; acetylsulphanilamide remains active in inhibiting carbonic anhydrase, though it does not inhibit bacteria. Inhibition of this enzyme cannot, therefore, be the mechanism of the normal anti-bacterial action of the sulphonamides, the metabolic basis for which remains obscure. Para-aminobenzoic acid is involved in reactions effected by the sulphonamides, but these reactions have not been specified, nor have the enzymes been isolated, as have those producing the secondary action of the drugs on carbonic anhydrase. Moreover, the drugs have other types of action on micro-organisms. Recent reports have shown that inhibition of the brucella-like organism *Bacterium tularense*[4] and of the spirochaete *Treponema recurrentis*[5] by sulphonamides differs from the main antibacterial effects of the drugs in not being antagonised by *p*-aminobenzoate. These actions also differ among themselves in the structural specificity of the compounds which produce them, and they may afford starting points for new types of chemotherapeutic drugs."

(1) Mann, T., and Keilin, D. (1940.) *Nature, Lond.* **146**. 164.
(2) Boughton, F. J. W., Dill, D. B., Darling, R. C., Graybiel, A., Knehr, C. A., and Talbott, J. H. (1941.) *Amer. J. Physiol.* **135**. 77.
(3) Benesch, R., Barron, N. S., and Mawson, C. A. (1944.) *Nature, Lond.* **153**. 138.
(4) Tamura, J. T. (1944.) *J. Bact.* **47**. 529.
(5) Hawking, F. (1944.) *Brit. J. exp. Path.* **25**. 63.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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GENITAL TUBERCULOSIS IN CATTLE

Sir,—I am indebted to Mr. D. N. Spriggs for raising some points, in his letter in your issue of December 23rd, which merit discussion.

I had purposely not made mention of the findings made on rectal palpation or *post-mortem* examination as I feel that such findings reviewed in so small a number of cases may so easily lead to wrong conclusions. However, Mr. Spriggs has drawn my attention to one wrong impression I had conveyed in my observations, in which I suggest that microscopical examination for tubercle bacilli should only be made in cases showing palpable ovarian or uterine abnormality.

Of the 12 positive cases quoted, four showed bilateral bursitis, three unilateral bursitis, one enlargement of one uterine horn, while four showed no palpable abnormality. It might, therefore, be argued that microscopic examination should be made in all cases of infertility, but I think that the carrying out of such a procedure must be governed by such factors as district, state of herd-health, existence of other obvious cause of infertility, and practitioner's time.

It is interesting to note that the *post-mortem* findings in case No. 3, one of tuberculous abortion not included in the above 12 cases, when slaughtered some four weeks later, showed conclusively

that the uterus had been infected by haematogenous spread. The endometrium showed a generalised speckling with pin-point lesions together with larger patches especially on some of the regressing cotyledons; there was no bursitis; the oviducts showed an increase in thickness, but not such as would have been recognisable on rectal palpation. The mucus exuding from the cervix showed no opacity, and I believe that by the time complete involution had taken place it would have been difficult in such a case as this to detect any abnormality per rectum. The uterine lesions appeared to conform more to those described by Stamp in cases of descending infection.

A further case without any palpable abnormality showed advanced pulmonary tuberculosis on *post-mortem* examination and the presence of a permanently gaping vulva due to injury may have predisposed to infection spreading to the genital tract *via* the faeces.

I agree with Mr. Spriggs that bursal abnormalities in the great majority of cows are associated with a previous history of retention-metritis, though I have the impression that adhesion and general thickening of the bursa is the main finding in these cases as opposed to nodular thickenings in tuberculous cases. I have not encountered cases in which the nodules break away under the fingers. Nodular thickenings sometimes appear to coalesce with the ovarian substance, while in two cases they formed a distinct band of adhesion extending to the pelvic wall and anchoring it thereto. In a further case in which there was an acute generalised tuberculous peritonitis there was thickening of both bursae without adhesion or nodular formation.

Unfortunately I have carried out *post-mortem* examinations in few cases, as the animals are usually fit to go to be graded. Information as to the relative frequency of haematogenous and peritoneal spread may be obtained from abattoir findings, but they do not present the same picture as that met in the field when the breeding history of the animal in question can be correlated with the pathological lesions found in the cadaver.

Yours faithfully,

Wrayton, Alderley Edge. JOHN BERGER.

January 2nd, 1945.

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LESION OF NASAL SEPTUM IN THE CAT

Sir,—Regarding Major Kirk's case—referred to in a clinical discussion reported in your issue of December 23rd—of a cat with a lesion of the septum of the nose, I should like to record what I believe to be a similar case in which the treatment eventually proved successful.

In this instance the lesion was situated not on the septum but on the right nostril, part of which appeared to be eroded. The site was subject to constant licking by the cat's tongue and various applications proved ineffectual. Finally it was resolved to try what the old text-books would refer to as heroic measures. Silver nitrate (40 per cent.) was applied firmly to the indolent area. The cat during this application was held tightly by the scruff of the neck to effect anterior immobility and eliminate the interfering action of the tongue. A shiny white protective eschar could be seen to form over the surface of the lesion. When this was well formed, scarlet red (Pellidol) ointment was applied around the edges.

It was found necessary to make only two applications of silver nitrate, but the scarlet red was applied three times a day, the animal being held firmly immobile for 15 to 20 minutes after each application. The rate of growth of epithelial tissue under this substance was astonishing. In six days' time the eschar itself had completely disappeared and the whole area that had once been lesion was now fresh, healthy tissue.

Yours faithfully,

54, High Street, Fishguard. JOHN F. BRADLEY.

December 29th, 1944.

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SIX-DAY CHICK DISEASE

Sir,—We feel constrained to make one further observation on the aspect of fibre in National baby chick mashes in relation to mortality in six-day chick disease. In the correspondence following the publication of our article, Messrs. Asplin *et al.* in your issue of November 25th and Watkins (December 16th) suggest that a high fibre content of the mash may have been the fundamental cause of the losses. Wilson in his most interesting article "Observations on Fowl Paralysis and Some Current Conditions in Poultry Problems" published in *The Veterinary Record* of December 30th, also mentions the possibility of an abnormally high percentage of fibre as being responsible for the trouble.

The fibre fraction in starter rations may prove detrimental to chicks in two entirely different ways: (1) Mechanically by producing impaction or enteritis and (2) Nutritionally by replacing metabolisable components. It has been our experience when impaction of any part of the gut occurs in the chick, that the larger pieces of fibre and husk have been retained in the gizzard and often in the terminal part of the intestine. The total fibre content of the rations fed may be quite normal and we attribute the condition to the size of fibre particles and irrespective of the quantity of fibre present.

In our field and experimental investigation in connection with six-day disease, there was no evidence of such impaction in the chicks which died and had been previously fed National chick mash. We further commented in our original paper that no inflammatory changes in the alimentary canal were observed on *post-mortem* examination. If the trouble had been due to a high percentage of finely ground fibre in the food, we should, from our experience, have expected to observe a well-marked enteritis throughout most of the small intestine. It is important to distinguish such losses through impaction or enteritis due to fibre from the syndrome of six-day disease. The former condition has been recognised for many years.

The digestive system of the fowl and more particularly of the baby chick is ill-equipped to hydrolyse fibre to digestible constituents, and owing to the bird's limited capacity for food, a high fibre content in poultry rations is undesirable since it acts as a diluent of other available nutrients. Wilson (*loc. cit.*) used a mash containing 12·3 per cent. fibre which could be described on the basis of experience and experiment as potentially unsafe for chick feeding on analysis alone. On the contrary the control mashes which consistently produced a high death-rate from six-day disease in our experiments showed, on chemical analyses, only 5·0 and 6·2 per cent. crude fibre respectively. These data are not dissimilar from the fibre content of many pre-war chick starter rations which gave excellent results.

We concluded that the cause of six-day disease is a deficiency of available energy in all mash chick starter rations due to an increase in unavailable constituents of the nitrogen-free extractives and not of "chemical" fibre. If fibre is used in a biological sense to indicate carbohydrate constituents of a ration which are unavailable to the animal, a definition which would include both fibre as determined by chemical assay and that fraction of the nitrogen-free extractives which are unavailable to the chick, then we are in full agreement.

We have not experienced six-day chick disease where impaction or enteritis have been noted at *post-mortem* examination and we do not consider this to be the primary cause of the condition. "Chemical" fibre or for that matter any material (such as charcoal used by Asplin and co-workers) which increases the bulk and lowers the concentration of nutrients in a ration *already inadequate* in available energy will accentuate the losses without being the fundamental cause of the condition.

Yours faithfully,

HAROLD TEMPERTON,
National Institute of Poultry Husbandry,
Newport, Shropshire.

D. W. P. BYTHELL,
Harper Adams Agricultural College,
Newport, Shropshire.

January 5th, 1945.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
Dec. 1st to 15th, 1944...	11	6	1	19	58
Corresponding period in—					
1943 ...	11	1	1	22	23
1942 ...	17	20	—	25	9
1941 ...	17	4	3	23	22
Total Jan. 1st to Dec. 15, 1944	181	175	8	233	1,396
Corresponding period in—					
1943 ...	275	18	9	224	524
1942 ...	348	662	27	265	434
1941 ..	387	264	20	211	1,064

NOTE.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.